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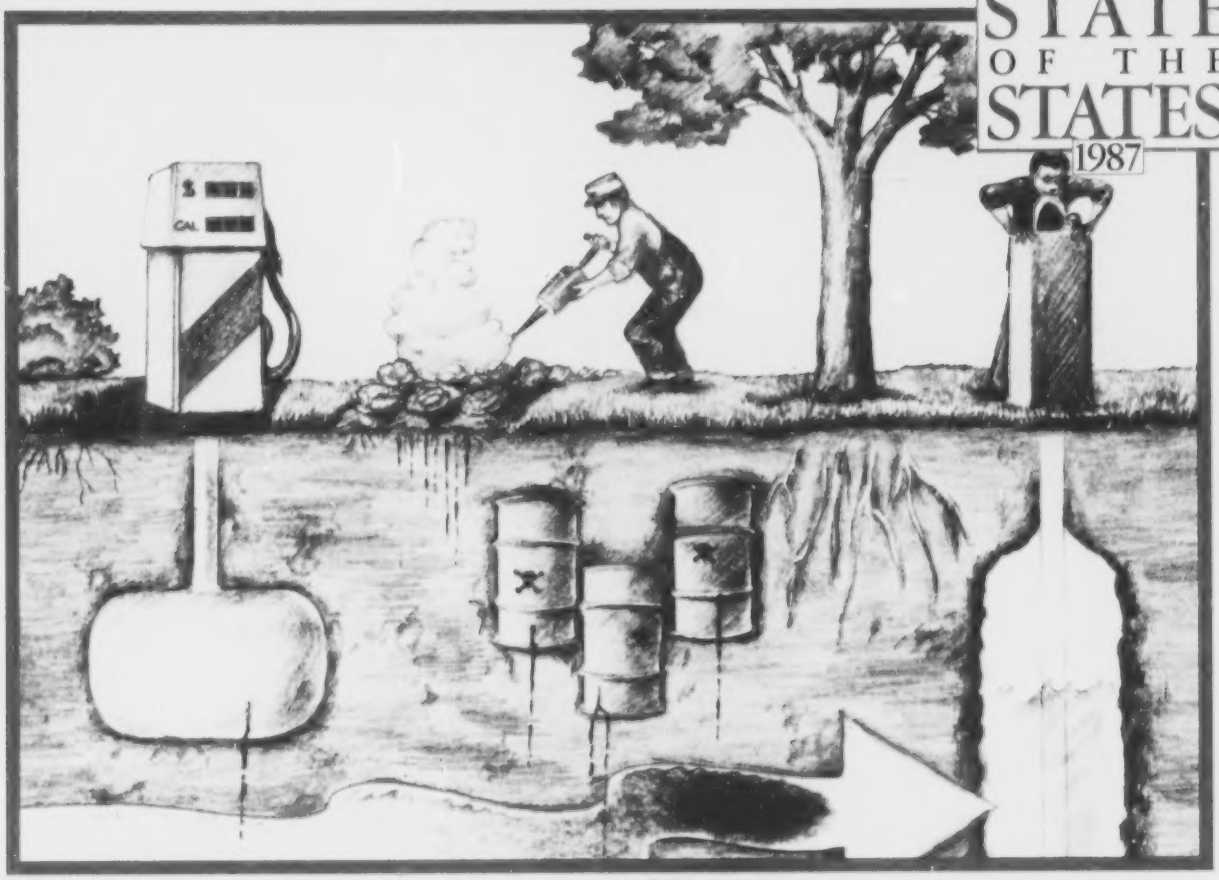
THE STATE OF THE STATES 1987



APPENDIX

FUND FOR RENEWABLE ENERGY & THE ENVIRONMENT

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Introduction

The Groundwater Protection Appendix, one of six appendices designed to supplement the data presented in the 1987 State of the States report, has been compiled to allow a more detailed look at groundwater protection on the state level. It provides a national picture of groundwater protection efforts through maps and detailed information, and it allows comparison of the problems states face and their legislative and program responses.

Information from the main report--state rankings, primary map, brief text, and primary matrix are presented in the forward section of the packet. Additional matrix information and maps, as well as groundwater protection contacts are also included.

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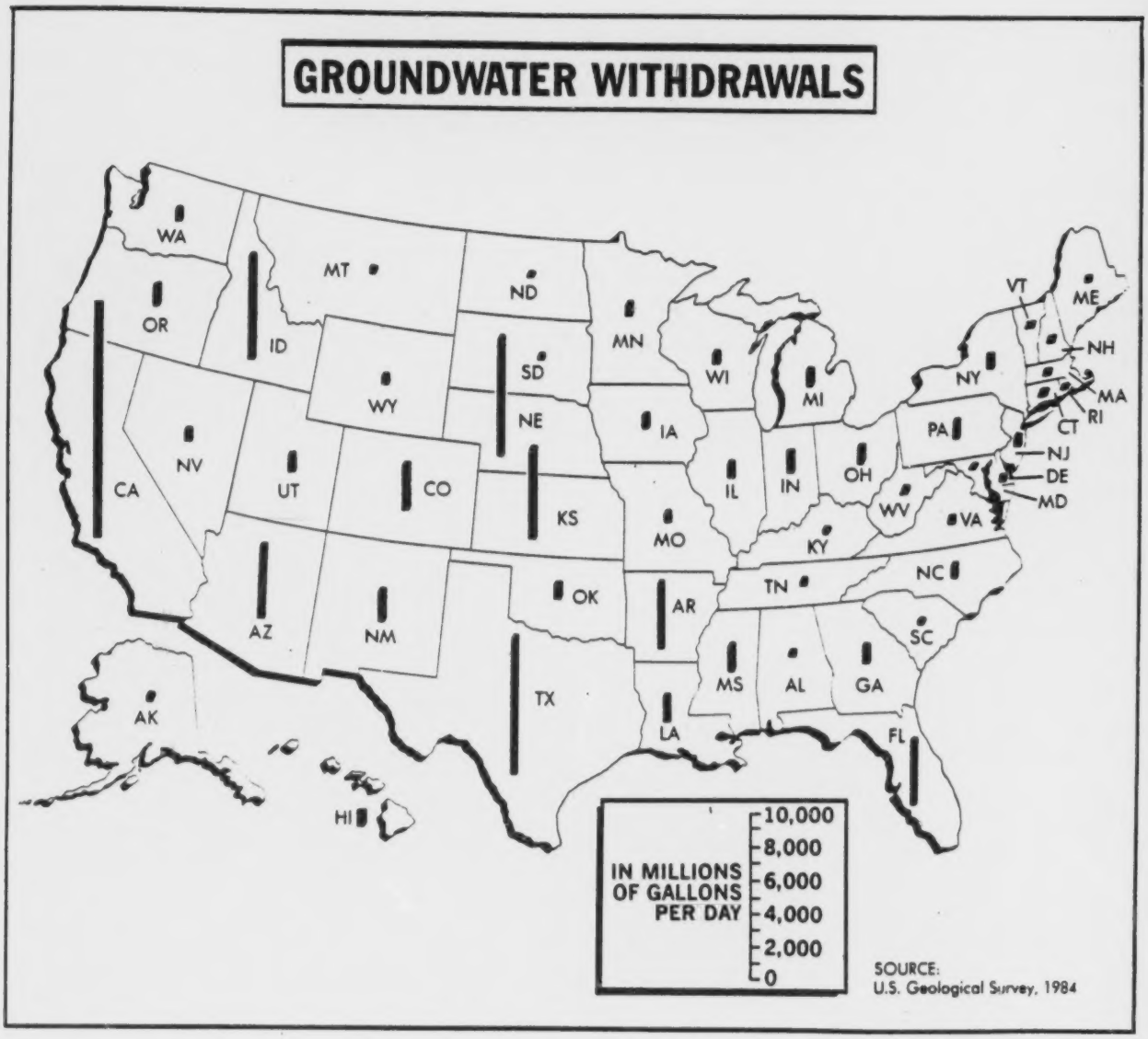
STATE ABBREVIATIONS

AL	ALABAMA
AK	ALASKA
AZ	ARIZONA
AR	ARKANSAS
CA	CALIFORNIA
CO	COLORADO
CT	CONNECTICUT
DE	DELAWARE
FL	FLORIDA
GA	GEORGIA
HI	HAWAII
ID	IDAHO
IL	ILLINOIS
IN	INDIANA
IA	IOWA
KS	KANSAS
KY	KENTUCKY
LA	LOUISIANA
ME	MAINE
MA	MASSACHUSETTS
MI	MICHIGAN
MN	MINNESOTA
MS	MISSISSIPPI
MO	MISSOURI
MT	MONTANA
NE	NEBRASKA
NV	NEVADA
NH	NEW HAMPSHIRE
NJ	NEW JERSEY
NM	NEW MEXICO
NY	NEW YORK
NC	NORTH CAROLINA
ND	NORTH DAKOTA
OH	OHIO
OK	OKLAHOMA
OR	OREGON
PA	PENNSYLVANIA
RI	RHODE ISLAND
SC	SOUTH CAROLINA
SD	SOUTH DAKOTA
TN	TENNESSEE
TX	TEXAS
UT	UTAH
VT	VERMONT
VA	VIRGINIA
WA	WASHINGTON
WV	WEST VIRGINIA
WI	WISCONSIN
WY	WYOMING

STATE PROGRAM RANKINGS: HOW STATES MEASURE UP

	AIR PROGRAMS	SOIL CONSERVATION PROGRAMS	GROUNDWATER PROGRAMS	HAZARDOUS WASTE PROGRAMS	SOLID WASTE PROGRAMS	RENEWABLE ENERGY & ENERGY CONSERVATION	TOTAL	RANK
AL	3	3	2	3	3	2	16	26
AK	7	3	3	2	2	1	18	25
AZ	7	3	7	5	2	3	27	19
AR	1	3	2	5	3	4	18	25
CA	10	3	7	9	9	10	48	2
CO	4	6	4	3	4	3	24	21
CT	9	6	9	4	9	7	44	4
DE	1	8	6	3	4	2	24	21
FL	7	4	9	8	6	7	41	7
GA	4	5	7	4	3	3	26	20
HI	4	4	3	2	2	4	19	24
ID	2	1	6	1	2	6	18	25
IL	7	9	5	7	7	6	41	7
IN	6	5	4	6	7	8	36	10
IA	5	10	5	5	7	7	39	8
KS	2	5	8	8	4	2	29	17
KY	7	3	1	6	8	3	28	18
LA	5	3	3	7	2	1	21	23
ME	3	6	7	6	6	8	36	10
MD	3	8	7	6	6	4	34	12
MA	6	4	8	9	6	8	41	7
MI	8	7	8	9	8	3	43	5
MN	5	6	5	9	9	4	38	9
MS	1	3	2	4	2	2	14	28
MO	5	6	7	8	1	4	31	15
MT	2	5	6	3	1	6	23	22
NE	4	6	6	2	6	7	31	15
NV	2	6	4	2	2	7	23	22
NH	6	5	5	7	5	4	32	14
NJ	9	6	7	10	10	5	47	3
NM	1	2	8	5	1	6	23	22
NY	5	5	10	8	8	7	43	5
NC	8	7	8	6	6	7	42	6
ND	1	3	4	2	3	3	16	26
OH	8	8	4	5	5	4	34	12
OK	5	5	5	4	7	3	29	17
OR	6	2	7	5	7	8	35	11
PA	8	6	5	5	3	5	32	14
RI	6	4	6	4	7	3	30	16
SC	6	5	7	5	2	6	31	15
SD	1	8	6	2	2	4	23	22
TN	3	3	4	7	5	7	29	17
TX	7	2	2	5	3	7	26	20
UT	3	4	3	2	1	3	16	26
VT	3	3	5	6	4	7	28	18
VA	8	7	6	2	3	7	33	13
WA	8	1	6	5	5	3	29	17
WV	2	5	2	4	1	1	15	27
WI	9	8	8	7	8	9	49	1
WY	1	3	8	1	2	1	16	26


GROUNDWATER WITHDRAWALS
WA
OR
CA
ID
NV
MT
WY
UT
AZ
CO
NM
ND
SD
NE
KS
OK
TX
MN
IA
MO
AR
LA
WI
IL
MS
MI
IN
KY
TN
AL
OH
WV
GA
FL
SC
NC
VA
PA
NY
VT
ME
NH
MA
RI
CT
NJ
DE
MD
AK
HI
IN MILLIONS OF GALLONS PER DAY
10,000
8,000
6,000
4,000
2,000
0
SOURCE:
U.S. Geological Survey, 1984

GROUNDWATER PROTECTION--THE BIG PICTURE

Groundwater is the nation's great hidden resource. It supplies drinking water for half our population. The nation's agricultural system is dependent on it. And its quality has a direct affect on our health. In total, underground aquifers in the United States are estimated to contain 16 times as much water as the Great Lakes. But despite this gigantic total volume, many individual aquifers face serious threats of contamination, depletion, or both.

It takes a daily leak of only a single gallon of gasoline, for example, to contaminate millions of gallons of water. A report issued by the U.S. Environmental Protection Agency in August 1986 indicates as many as 300,000 underground storage tanks are leaking into the subsoil. Another EPA document identifies 12,442 incidents of leaking underground storage tanks reported to state governments.

Groundwater supplies are also threatened by "nonpoint source" pollution--agricultural runoff from pesticides, herbicides, and salt leached from highways. In rural areas where 90 percent of the population is dependent on groundwater for drinking, heavy use of chemicals on the land over the past thirty years has resulted in steadily increasing contamination.

To address the problem of groundwater contamination most states need technical assistance, as well as funding and models for research and legislation. Twenty-eight states currently have groundwater strategy plans in place, but the adequacy of the plans varies widely. The most stringent policy, passed by nine states, mandates nondegradation of water quality. Five other states allow limited degradation, and the remainder have no formal policy. Land-use policies to protect groundwater recharge areas such as swamps are vital to long term progress.

The federal government currently helps states to oversee groundwater protection with a patchwork of sixteen federal laws. Federal soil erosion laws aim at reducing nonpoint source pollution, for example, and the Resource Conservation and Recovery Act requires groundwater monitoring at hazardous waste and solid waste dumpsites. Currently more than two dozen federal agencies and offices are responsible for some aspect of groundwater protection.

Support is now building for consolidation of federal groundwater laws and oversight. Legislation is expected to propose establishment of a national groundwater protection goal and an interagency task force. This should provide a stimulus and context for continuing state efforts.

GROUNDWATER SNAPSHOT

The state of New York has formulated the best policies for groundwater protection. More than six million of the state's 18 million residents rely on groundwater for drinking supplies. Half of those consumers live on Long Island where there have been acute groundwater problems. The state Department of Health and the Department of Environmental Conservation work with a variety of local agencies to implement land-use control of aquifer recharge areas, and monitor for pesticides, salt water intrusion, hazardous waste, and non-hazardous waste. The state has also formulated laws to detect and prevent pollution from leaking underground storage tanks and adminsters a well permit program that regulates all major groundwater withdrawals.

RANKING NOTES

States were ranked on a scale of one to ten on the strength of their environmental policies. The rank is not meant to judge particular environmental conditions in each state, but considers environmental problems as a need for program strength. Key factors weighed against this need are: legislative authority for programs, scope of established programs, extent of funding, monitoring and enforcement, and indications of progress. Although institutionalized programs rather than innovative projects are given greater weight--attention is given to assure that states did not simply "paper over" a problem with legislation.

The broad indicators of a need for groundwater protection are the amount of groundwater withdrawal per day and the percentage of population served by groundwater. Legislative authority to implement a strategy plan and the existence of a plan were considered essential to progress. Added to this are programs for mapping, groundwater quality standards with more than two categories, and state policies for controlled land-use areas. The strongest state programs allowed for a variety of monitoring at suspected contamination sites, had well-integrated state and local programs, and advocated non-degradation or limited degradation of groundwater supplies.

Consideration was also made of the existence or extent of laws and regulations to addresss leaking underground storage tanks.

GROUNDWATER MATRIX

	LEGISLATIVE AUTHORITY TO IMPLEMENT STRATEGY MNGT. PLAN	GROUNDWATER STRATEGY MNGT. PLAN IN PLACE	GROUNDWATER QUALITY STAND. IN PLACE	STRATEGY PLAN INCLUDES MAPPING	LEAKING UNDERGROUND STORAGE TANK LEGISLATION	NON-DEGRADATION OR LIMITED DEGRADATION AS STATE POLICY	MONITORING FOR PESTICIDES, SALT WATER INTRUSION, HAZ. WASTE, NON-HAZ. WASTE	STATE POLICY FOR CONTROLLED LAND USE AREAS	PERCENTAGE OF POPULATION SERVED BY GROUNDWATER	GROUNDWATER WITHDRAWAL PER DAY (MGAL)
AL							NH,SW,HW		52%	290
AK			•				P		69	49
AZ	•	•					P,HW,NH	•	65	4,200
AR							HW		50	4,300
CA	•			•	•	N	P,HW		46	14,600
CO	•	•			•			•	15	2,800
CT	•	•	•	•	•		P,HW,NH		32	150
DE	•	•		•	•		P,HW,NH		60	82
FL	•	•	•		•		P,SW,NH	•	90	3,800
GA	•	•		•		N	P,SW,HW,NH		48	1,200
HI		•		•			P	•	95	710
ID	•	•		•			P,HW,NH	•	88	6,300
IL	•	•	•	•			HW		49	980
IN	•	•		•			HW		32	1,200
IA	•				•	N	P	•	82	900
KS	•	•		•	•		P,SW,HW,NH	•	49	5,600
KY	•								31	180
LA					•		HW	•	69	1,800
ME	•	•		•	•	N	P,HW,NH		57	80
MD	•		•		•		HW,NH		30	175
MA	•	•	•	•			P,HW,NH		33	320
MI	•	•	•		•	N	HW,NH	•	43	530
MN	•		•				P,HW,NH	•	75	670
MS	•							•	93	1,500
MO	•		•	•		N	P,HW		34	470
MT			•			N	P	•	54	200
NE	•	•	•	•			NH	•	82	7,100
NV	•						HW,NH	•	50	710
NH			•		•	N	P,HW,NH		60	65
NJ	•	•	•	•			HW,SW,NH	•	45	730
NM	•	•	•	•		L	P,SW,HW,NH	•	89	1,800
NY	•	•	•	•	•	L	P,SW,HW,NH	•	35	970
NC	•	•	•	•	•		HW,SW,NH	•	55	770
ND	•			•			P,HW,NH		62	110
OH	•			•			HW,NH		42	740
OK	•	•		•	•		P		41	960
OR	•	•				L	P,HW,NH	•	61	1,100
PA	•			•		L	P,HW,	•	44	1,000
RI	•	•		•		N	P,HW,NH		24	37
SC		•	•	•	•		P,SW,HW,NH	•	42	210
SD		•		•	•		P,HW,NH		77	330
TN		•	•	•			P		51	460
TX							P,SW,HW,NH	•	47	9,700
UT					•			•	63	772
VT		•			•		P,HW,NH		56	45
VA		•	•	•			P,SW,HW	•	46	370
WA	•			•			P,SW,HW,NH	•	71	750
WV				•			P,HW		53	220
WI	•		•		•	L	P,HW,NH		70	580
WY	•	•	•	•	•		NH	•	54	540

1. Legislative authority to implement a groundwater strategy plan is one of the most fundamental measures a state can undertake.
Source: Association of State and Interstate Water Pollution Control Administrators, Washington, D.C.

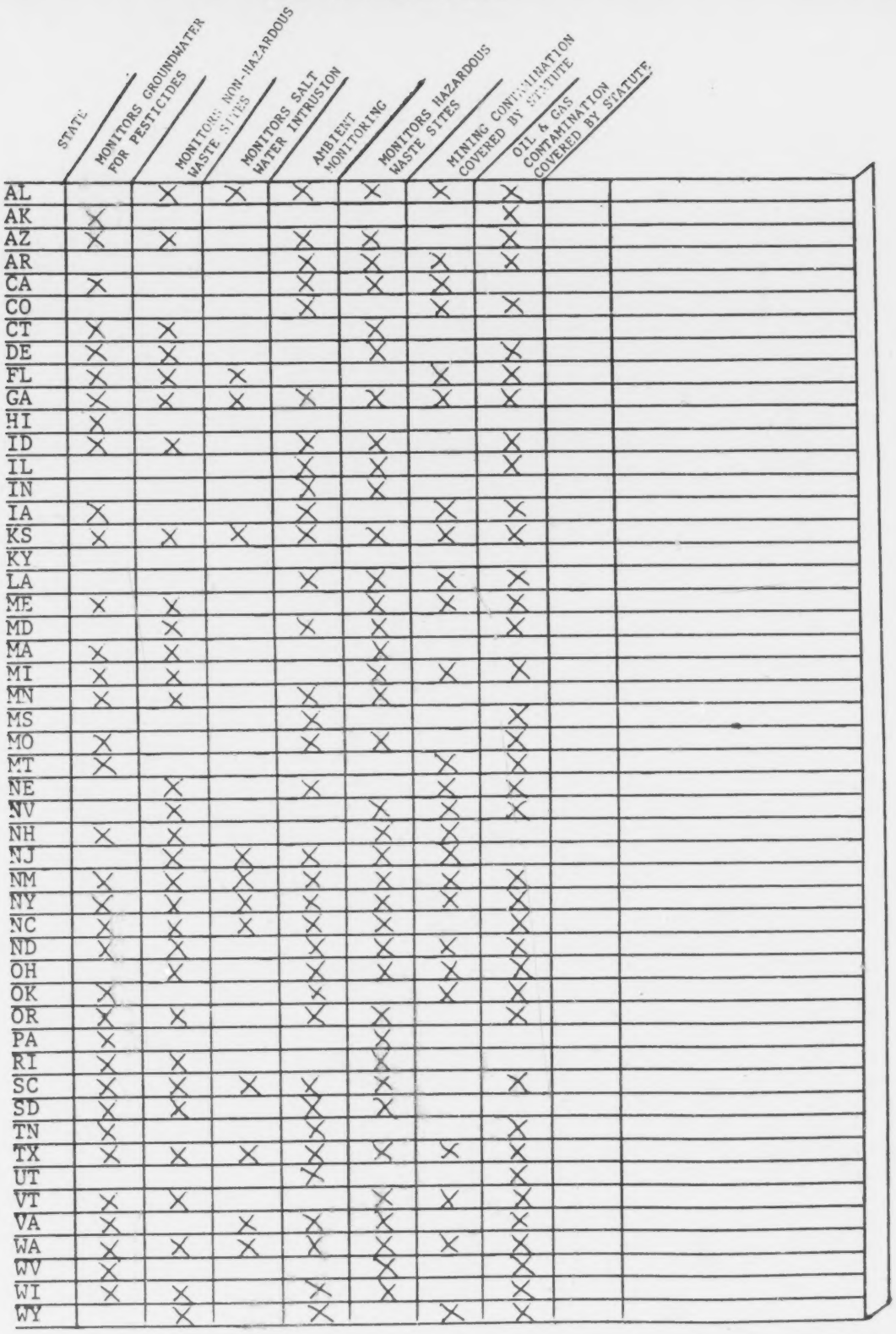
2. Leaking Underground storage tank legislative information is from US EPA, Office of Underground Storage Tanks, Washington, DC.

3. Nondegradation policy information is from ASIWPCA, 1985.

4. Monitoring information is from: US EPA, Office of Groundwater Protection, State Groundwater Program Summaries, Vol. 2, Washington, DC, 1985.

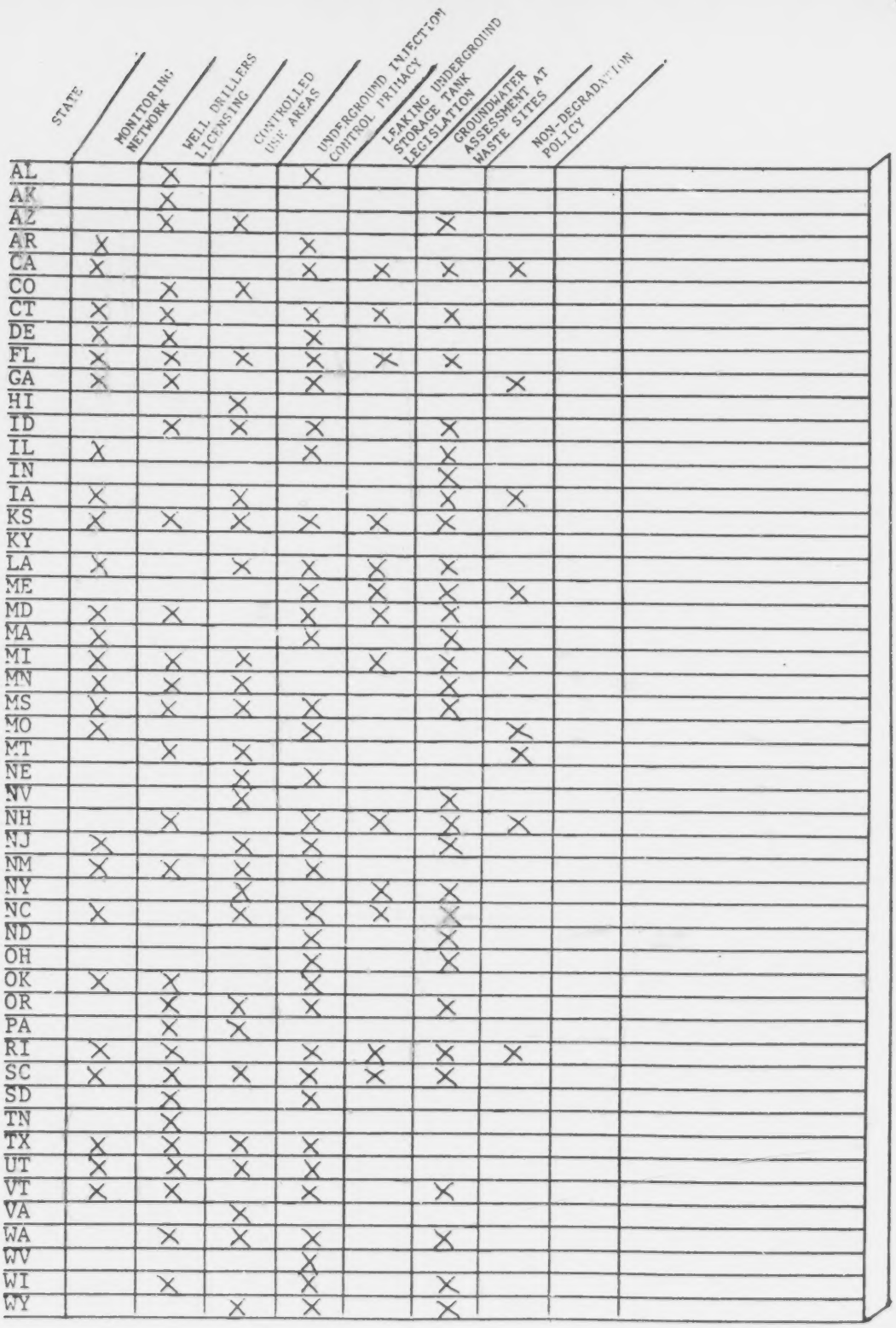
5. Figures on groundwater consumption and withdrawal are from: US Geological Survey, National Water Summary, Washington, DC. 1984.

SCOPE OF STATE PROGRAMS

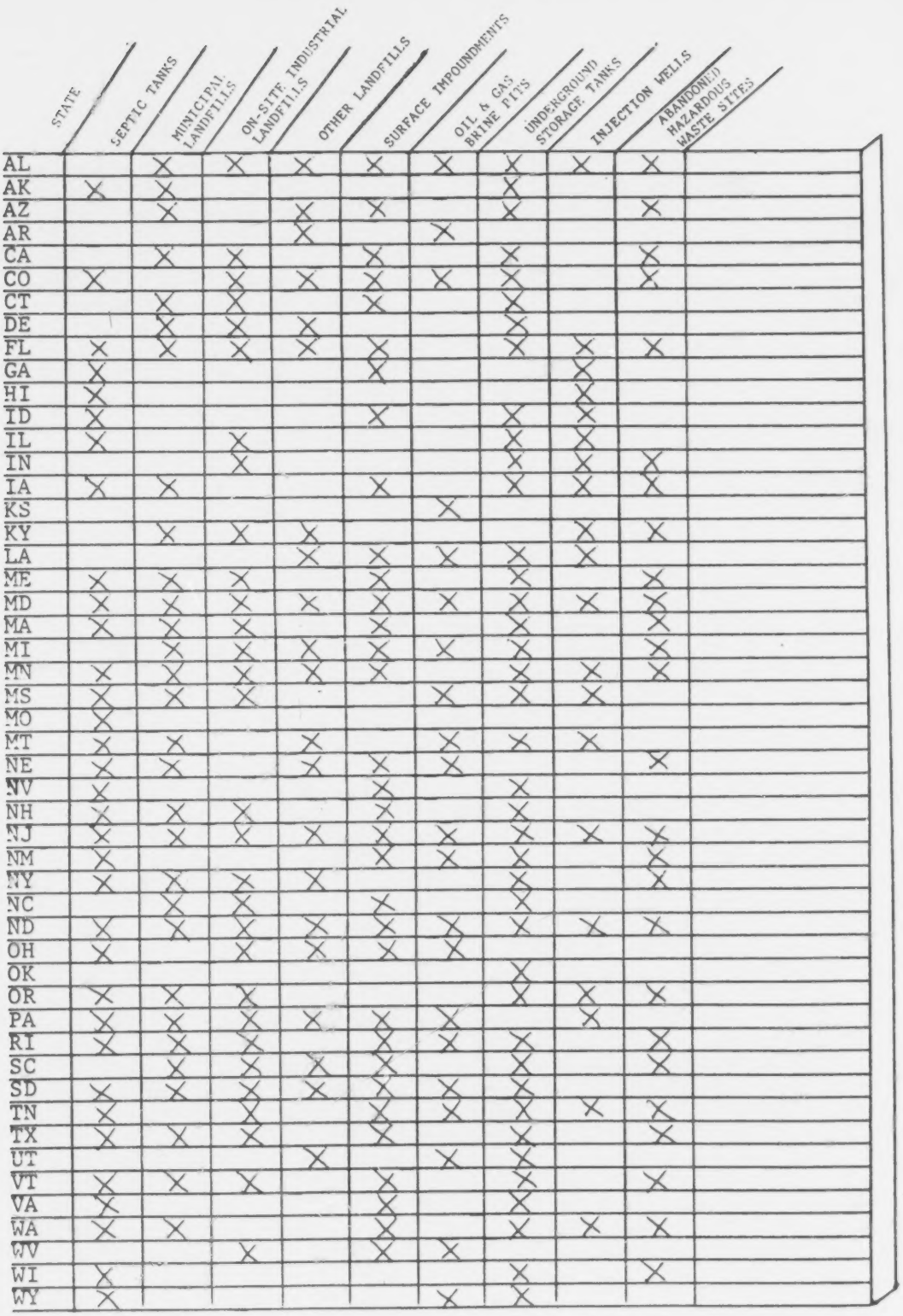


STATE	MONITORS GROUNDWATER FOR PESTICIDES	MONITORS NON-HAZARDOUS WASTE SITES	MONITORS SALT WATER INTRUSION	AMBIENT MONITORING	MONITORS HAZARDOUS WASTE SITES	MINING CONTAMINATION COVERED BY STATUTE	OIL & GAS CONTAMINATION COVERED BY STATUTE		
AL		X	X	X	X	X	X		
AK	X						X		
AZ	X	X		X	X		X		
AR				X	X	X	X		
CA	X			X	X	X			
CO				X		X	X		
CT	X	X			X				
DE	X	X			X		X		
FL	X	X	X			X	X		
GA	X	X	X	X	X	X	X		
HI	X								
ID	X	X		X	X		X		
IL				X	X		X		
IN				X	X				
IA	X			X		X	X		
KS	X	X	X	X	X	X	X		
KY									
LA				X	X	X	X		
ME	X	X			X	X	X		
MD		X		X	X		X		
MA	X	X			X				
MI	X	X			X	X	X		
MN	X	X		X	X				
MS				X			X		
MO	X			X	X		X		
MT	X					X	X		
NE		X		X		X	X		
NV		X			X	X	X		
NH	X	X			X	X			
NJ		X	X	X	X	X			
NM	X	X	X	X	X	X	X		
NY	X	X	X	X	X	X	X		
NC	X	X	X	X	X		X		
ND	X	X		X	X	X	X		
OH		X		X	X	X	X		
OK	X			X		X	X		
OR	X	X		X	X		X		
PA	X				X				
RI	X	X			X				
SC	X	X	X	X	X		X		
SD	X	X		X	X				
TN	X			X			X		
TX	X	X	X	X	X	X	X		
UT				X			X		
VT	X	X			X	X	X		
VA	X		X	X	X		X		
WA	X	X	X	X	X	X	X		
WV	X				X		X		
WI	X	X		X	X		X		
WY		X		X		X	X		

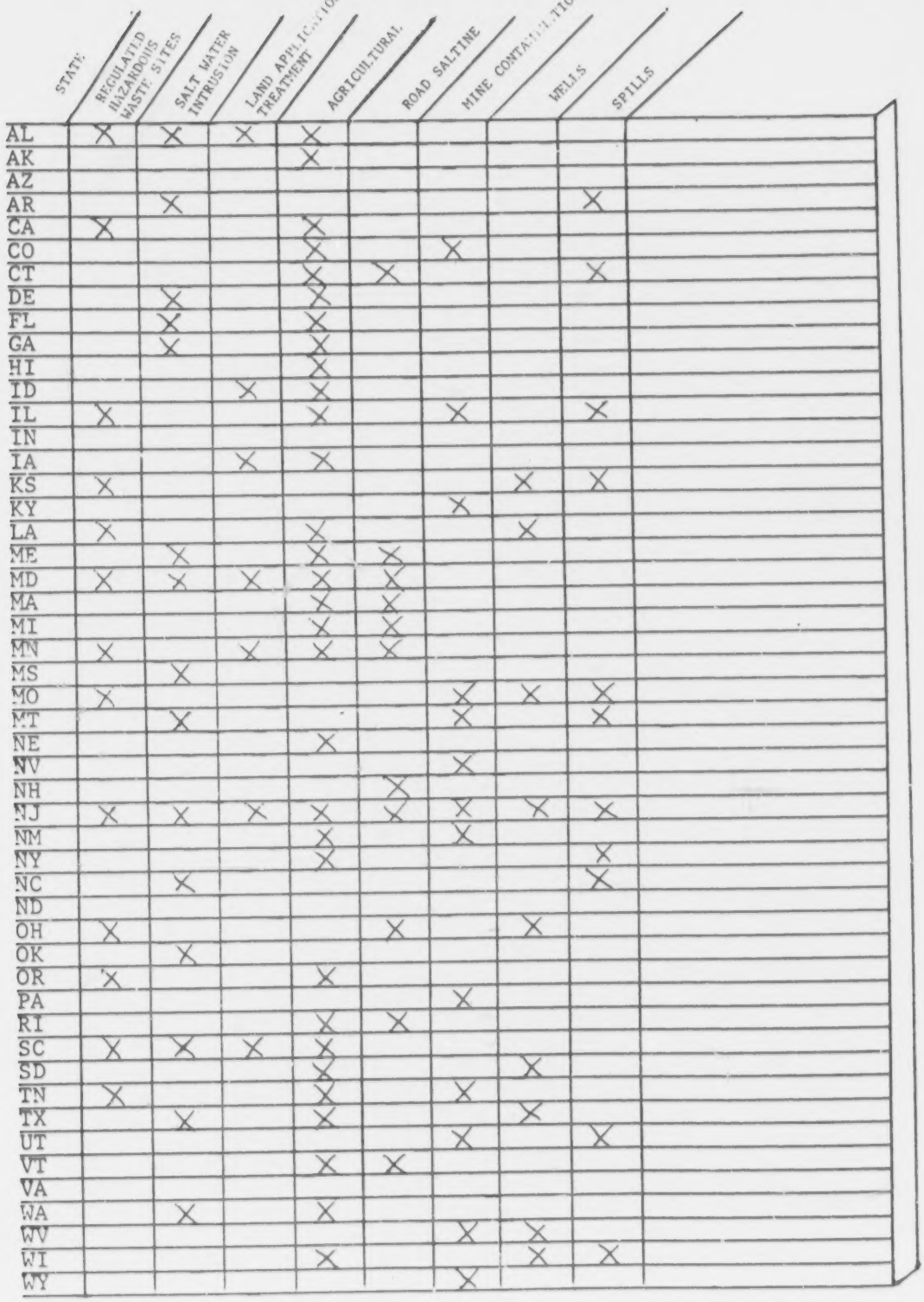
SCOPE OF STATE PROGRAMS



MAJOR SOURCES OF CONTAMINATION



MAJOR SOURCES OF CONTAMINATION



Summary of fresh ground-water withdrawals as a percentage of total fresh surface- and ground-water withdrawals for all categories of use and for specific categories of use, by State

[Data rounded to two significant figures. Data not included for Trust Territory of the Pacific Islands, Saipan, Guam, and American Samoa. Mgal = million gallons. Sources: State data from table 1 in respective State summary, *National Water Summary 1984*; total data from Solley, Chase, and Mann, 1983]

State	Total surface- and ground-water withdrawals per day (Mgal)	Percentage of population served by ground water	Ground-water withdrawals per day (Mgal)	Ground-water withdrawals as a percentage of total fresh surface- and ground-water withdrawals for—					
				All categories of use[1]	Specific categories of use				
					Public supply	Rural supply		Industrial self-supplied[1]	Irrigation
						Domestic	Livestock		
Alabama	8,700	52	290	3 (14)	28	100	34	0.6 (4)	30
Alaska	220	69	49	22 (26)	43	99	0	9 (11)	0
Arizona	7,300	65	4,200	58 (57)	54	100	82	72 (88)	58
Arkansas	33,000	50	4,300	13 (81)	42	100	36	1 (55)	86
California	38,000	46	14,600	39 (38)	46	93	41	54 (89)	39
Colorado	16,000	15	2,800	18 (18)	8	36	18	2 (1)	19
Connecticut	1,300	32	150	11 (20)	17	100	18	3 (10)	8
Delaware	140	60	82	59 (37)	38	100	100	68 (73)	63
District of Columbia	340	0	.8	.2 (.4)	0	0	0	.6 (57)	0
Florida	7,300	90	3,800	52 (69)	86	100	66	27 (82)	53
Georgia	6,700	48	1,200	18 (52)	29	100	61	8 (57)	66
Hawaii	1,700	95	710	41 (37)	90	90	96	73 (20)	93
Idaho	18,000	88	6,300	35 (35)	94	96	42	95 (95)	25
Illinois	18,000	49	980	5 (24)	27	97	100	1 (10)	100
Indiana	14,000	32	1,200	11 (30)	41	90	18	8 (18)	98
Iowa	3,200	82	900	28 (81)	81	100	100	13 (71)	84
Kansas	6,600	49	5,600	85 (89)	48	86	43	35 (77)	92
Kentucky	4,600	31	180	4 (22)	13	91	5	2 (25)	6
Louisiana	12,000	69	1,800	14 (27)	44	100	70	5 (12)	47
Maine	850	57	80	9 (10)	19	98	59	5 (5)	3
Maryland	1,400	30	175	13 (17)	9	100	54	6 (18)	54
Massachusetts	2,500	33	320	13 (28)	24	100	58	6 (30)	28
Michigan	15,000	43	530	4 (18)	17	100	77	1 (3)	37
Minnesota	3,100	75	670	22 (48)	52	100	85	5 (20)	88
Mississippi	2,900	93	1,500	54 (82)	18	100	77	21 (61)	35
Missouri	6,900	34	470	7 (34)	22	74	26	2 (39)	75
Montana	11,000	54	200	2 (2)	39	94	38	20 (52)	1
Nebraska	12,000	82	7,100	59 (73)	77	100	80	3 (85)	67
Nevada	3,600	50	710	20 (20)	40	94	31	30 (45)	17
New Hampshire	380	60	65	17 (21)	48	98	25	5 (6)	0
New Jersey	2,900	45	730	25 (37)	40	100	67	10 (20)	73
New Mexico	3,900	89	1,800	47 (47)	90	97	50	25 (98)	44
New York	7,900	35	970	12 (28)	23	89	65	4 (11)	46
North Carolina	8,100	55	770	10 (20)	12	100	85	6 (17)	30
North Dakota	1,000	62	110	11 (11)	54	100	40	.3 (25)	37
Ohio	13,000	42	740	6 (32)	27	90	60	2 (16)	36
Oklahoma	1,700	41	960	56 (61)	28	83	12	23 (35)	84
Oregon	6,800	61	1,100	17 (17)	29	87	27	15 (16)	14
Pennsylvania	16,000	44	1,000	6 (16)	16	100	88	4 (15)	14
Puerto Rico	1,100	26	246	22 (35)	22	42	50	3 (21)	34
Rhode Island	170	24	37	22 (21)	15	100	50	36 (36)	9
South Carolina	5,800	42	210	4 (21)	22	100	55	1 (5)	27
South Dakota	690	77	330	48 (48)	68	94	88	54 (55)	33
Tennessee	10,000	51	460	5 (21)	40	100	17	2 (11)	51
Texas	16,000	47	9,700	61 (62)	46	84	49	23 (24)	70
Utah	4,300	63	770	18 (18)	66	90	80	14 (16)	10
U.S. Virgin Islands	6	42	1.1	18 (18)	12	100	0	0 (0)	0
Vermont	340	54	45	13 (50)	35	85	62	2 (35)	19
Virginia	5,600	41	370	7 (30)	17	100	10	2 (24)	29
Washington	8,200	71	750	9 (9)	37	78	67	15 (15)	4
West Virginia	5,600	53	220	4 (22)	27	95	13	3 (18)	8
Wisconsin	5,900	70	580	10 (46)	48	100	96	1 (15)	97
Wyoming	5,300	54	540	10 (11)	33	92	21	34 (76)	8
Total or percentage	380,000	51	88,000	23 (38)	35	97	55	6 (26)	40

[1] Number in parentheses was calculated excluding thermoelectric po

INCIDENTS OF LEAKING UNDERGROUND STORAGE TANKS REPORTED TO STATES

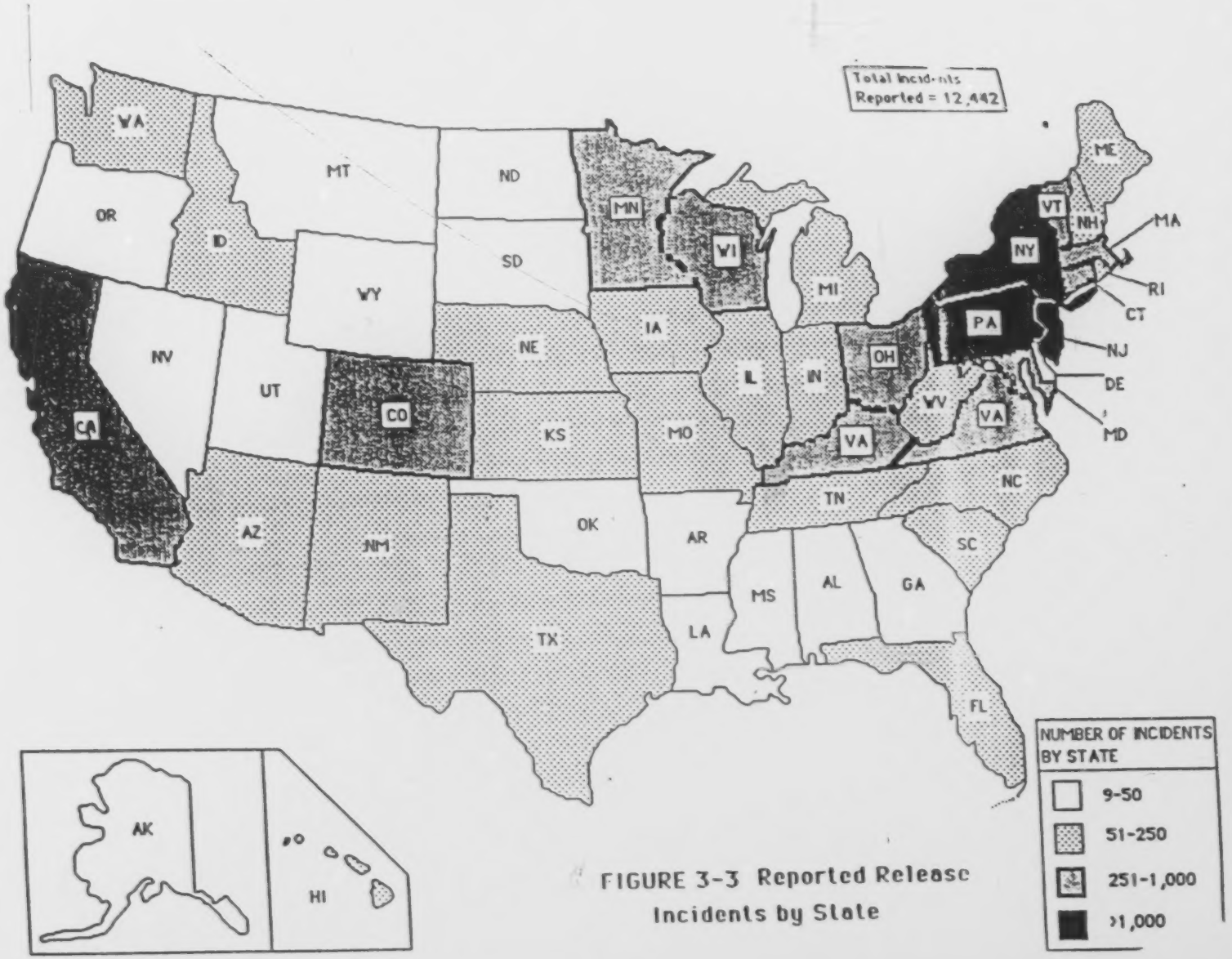
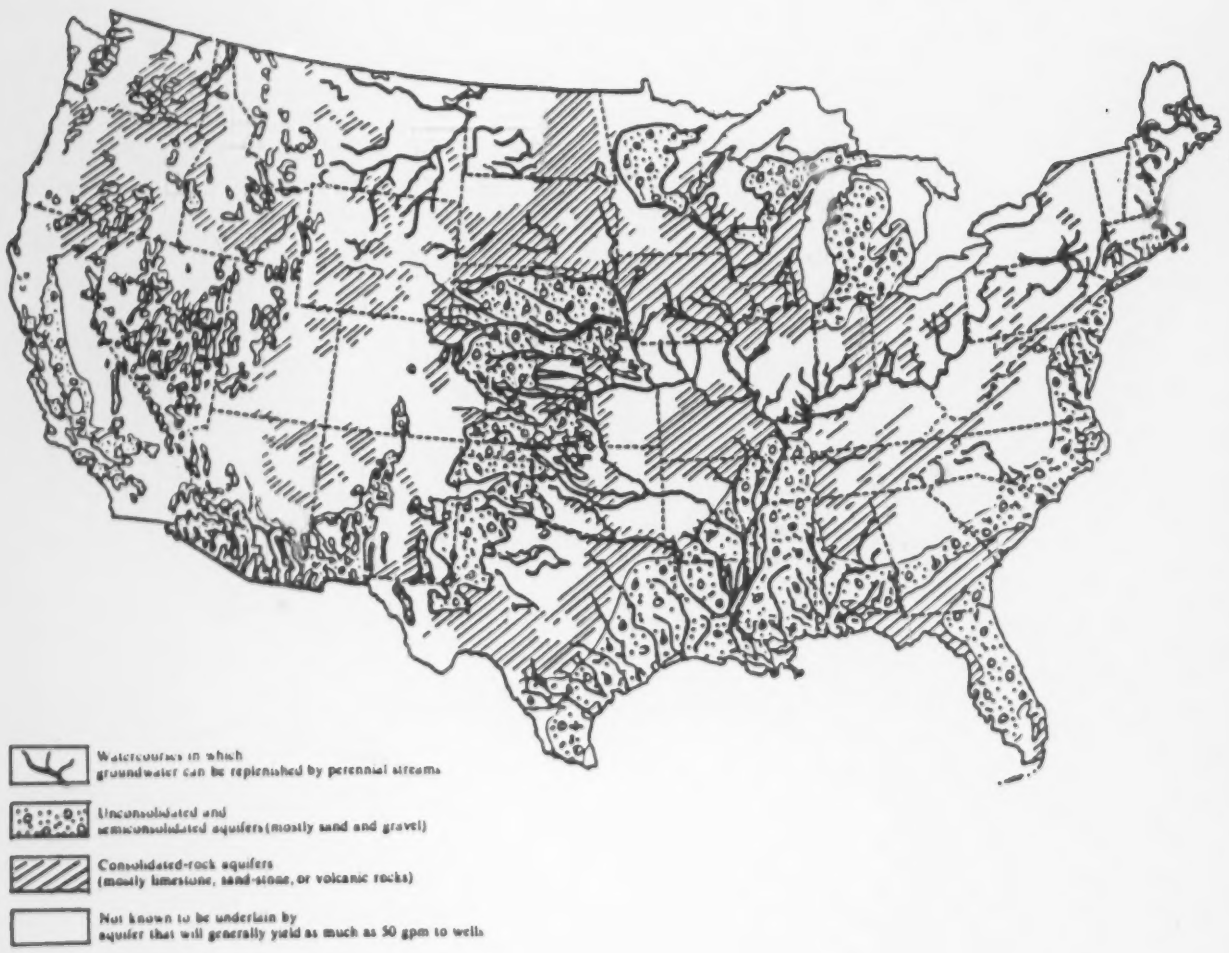


FIGURE 3-3 Reported Release Incidents by State

Major aquifers in the continental United States


Watercourses in which groundwater can be replenished by perennial streams
Unconsolidated and semiconsolidated aquifers (mostly sand and gravel)
Consolidated-rock aquifers (mostly limestone, sand-stone, or volcanic rocks)
Not known to be underlain by aquifer that will generally yield as much as 50 gpm to wells

Source: Groundwater: A Community Action Guide, Concern, Inc. Washington, D.C., 1984

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